

Appl. No. 09/931,562
Letter dated April 5, 2004
Reply to Office Action of February 9, 2004

Listing of Claims:

1. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable with respect to the catheter tube, at least one of said catheter tube and ~~the~~ said inner medical element being remotely controllable to form a curve in the distal end thereof, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position, said moving step occurring with the distal end of the inner element disposed distally of the distal tip of the catheter tube;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter by remotely controlling the distal end of at least one of the catheter tube and the inner medical element to form a curve therein such that the distal end of the combination catheter takes a desired shape;

verifying the desired shape by imaging the catheter tube and the inner medical element.

2. (original) The method as set forth in claim 1 wherein the imaging is done by fluoroscopy.

3. (previously presented) The method as set forth in claim 1 wherein the inner medical element is remotely controllable to assume curved configurations, said shaping step including manipulating the distal end of the inner medical element by remote control to form a curved configuration.

4. (original) The method as set forth in claim 1 wherein one of the inner medical element and the catheter tube has a preformed curve in the distal end thereof.

5. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable in use with respect to the catheter tube, said catheter tube having a curve preformed in the distal end of the catheter tube, said inner medical element being remotely controllable to assume curved configurations, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said

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shaping step including manipulating the distal end of the inner medical element by remote control to form a curved configuration;

verifying the desired shape by imaging the catheter tube and the inner medical element.

6. (original) The method as set forth in claim 5 wherein the imaging is done by fluoroscopy.

7. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable with respect to the catheter tube, said catheter tube having a preformed curve in the distal end of the catheter tube having a first radius of curvature, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape in which the distal end of the inner medical element has a second radius of curvature, said desired shape being one of a plurality of possible shapes the distal end of the combination

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catheter can take, the distal ends of both the catheter tube and the inner medical element being defined as extending proximally, measured from the extreme distal tip of each, only a distance not substantially greater than three times the smaller of the first and second radii of curvature;

verifying the desired shape by imaging the catheter tube and the inner medical element.

8. (original) The method as set forth in claim 7 wherein the imaging is done by fluoroscopy.

9. (previously presented) The method as set forth in claim 7 wherein the inner medical element is remotely controllable to assume curved configurations, said shaping step including manipulating the distal end of the inner medical element by remote control to form a curved configuration.

10. (original) The method as set forth in claim 7 wherein the inner medical element has a preformed curve in the distal end thereof.

11. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable with respect to the catheter tube, said catheter tube having a preformed curve in the distal end of the catheter tube having a first arc length, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape in which the inner medical element has a second arc length, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take, the distal ends of both the catheter tube and the inner medical element being defined as extending proximally, measured from the extreme distal tip of each, only a distance not substantially greater than three times the smaller of the first and second arc lengths;

verifying the desired shape by imaging the catheter tube and the inner medical element.

12. (original) The method as set forth in claim 11 wherein the imaging is done by fluoroscopy.

13. (previously presented) The method as set forth in claim 11 wherein the inner medical element is remotely controllable to assume curved configurations, said shaping step including manipulating the distal end of the inner medical element by remote control to form a curved configuration.

14. (original) The method as set forth in claim 11 wherein the inner medical element has a preformed curve in the distal end thereof.

15. (canceled)

16. (canceled)

17. (canceled)

18. (canceled)

19. (canceled)

20. (previously presented) A method of manipulating the shape of a combination catheter in a human body comprising:

inserting a catheter tube into a human body, said catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, said catheter tube further having remote control apparatus extending from the proximal end of the catheter tube for deflecting the distal end of the catheter tube;

disposing an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a distal end preformed in a curved configuration independent of the catheter tube, said catheter tube and said inner medical element constituting a combination catheter;

imaging the combination catheter while it is in the human body;

modifying the shape of the distal end of the combination catheter during imaging by relative manipulation of the inner medical element and the outer catheter tube, said shaping step including manipulating the distal end of the catheter tube by remote control to form a curved configuration.

21. (original) The method as set forth in claim 20 wherein the inner medical element and the outer catheter tube are fixed in place with respect to each other once the shape of the distal end of the combination catheter is modified.

22. (original) The method as set forth in claim 20 wherein the imaging is done fluoroscopically.

23. (previously presented) A method of manipulating the shape of a combination catheter in a human body comprising:

inserting a catheter tube into a human body, said catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, said catheter tube further having a preformed curve in the distal end of the catheter tube;

disposing an inner medical element disposed in the lumen of the catheter tube, said inner medical element having remote control apparatus for selectively forming curved configurations of the inner medical element independent of the catheter tube, said catheter tube and said inner medical element constituting a combination catheter;

imaging the combination catheter while it is in the human body;

modifying the shape of the distal end of the combination catheter during imaging by relative manipulation of the inner medical element and the outer catheter tube, said modifying of the shape including axial movement of the inner medical element with respect to the catheter tube during operation and manipulating the distal end of the inner medical element by remote control to form a curved configuration.

24. (original) The method as set forth in claim 23 wherein the inner medical element and the outer catheter tube are fixed in place with respect to each other once the shape of the distal end of the combination catheter is modified.

25. (original) The method as set forth in claim 23 wherein the imaging is done fluoroscopically.

26. (previously presented) A method of manipulating the shape of a combination catheter in a human body comprising:

inserting a catheter tube into a human body, said catheter tube having an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, said catheter tube further having remote control apparatus extending from the proximal end of the catheter tube for deflecting the distal end of the catheter tube;

disposing an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a distal end remotely formable in a curved configuration independent of the catheter tube, said catheter tube and said inner medical element constituting a combination catheter;

imaging the combination catheter while it is disposed in the human body;
modifying the shape of the distal end of the combination catheter during imaging by relative manipulation of the inner medical element and the outer catheter tube and manipulating the distal end of the catheter tube by remote control to form a curved configuration.

27. (original) The method as set forth in claim 26 wherein the inner medical element and the outer catheter tube are fixed in place with respect to each other once the shape of the distal end of the combination catheter is modified.

28. (original) The method as set forth in claim 26 wherein the imaging is done fluoroscopically.

29. (previously presented) A method of manipulating the shape of a combination catheter in a human body comprising:

inserting a catheter tube into a human body, said catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, said catheter tube further having a preformed curve in the distal end of the catheter tube, said preformed curve having a first radius of curvature;

disposing an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a distal end with a preformed curve, said preformed curve having a second radius of curvature, said catheter tube and said inner medical element constituting a combination catheter;

the distal end of the catheter tube being defined as extending proximally from the extreme distal tip of the catheter tube only a distance not substantially greater than three times the smaller of the first and second radii of curvature, the distal end of the inner medical element being defined as extending proximally from the extreme distal tip of the inner medical element only a distance not substantially greater than three times the smaller of the first and second radii of curvature;

imaging the combination catheter while it is in the human body;

modifying the shape of the distal end of the combination catheter during imaging by relative manipulation of the inner medical element and the outer catheter tube to form a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take.

30. (original) The method as set forth in claim 29 wherein the inner medical element and the outer catheter tube are fixed in place with respect to each other once the shape of the distal end of the combination catheter is modified.

31. (original) The method as set forth in claim 29 wherein the imaging is done fluoroscopically.

32. (previously presented) A method of manipulating the shape of a combination catheter in a human body comprising:

inserting a catheter tube into a human body, said catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, said catheter tube further having a preformed curve in the distal end of the catheter

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tube, said preformed curve having a first arc length;

disposing an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a distal end with a preformed curve, said preformed curve having a second arc length, said catheter tube and said inner medical element constituting a combination catheter;

the distal end of the catheter tube being defined as extending proximally from the extreme distal tip of the catheter tube only a distance not substantially greater than three times the smaller of the first and second arc lengths, the distal end of the inner medical element being defined as extending proximally from the extreme distal tip of the inner medical element only a distance not substantially greater than three times the smaller of the first and second arc lengths;

imaging the combination catheter while it is in the human body;

modifying the shape of the distal end of the combination catheter during imaging by relative manipulation of the inner medical element and the outer catheter tube to form a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take.

33. (original) The method as set forth in claim 32 wherein the inner medical element and the outer catheter tube are fixed in place with respect to each other once the shape of the distal end of the combination catheter is modified.

34. (original) The method as set forth in claim 32 wherein the imaging is done fluoroscopically.

35. (canceled)

36. (canceled)

37. (canceled)

38. (canceled)

39. (withdrawn) A combination catheter comprising:

a catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, the distal end being capable of assuming a curved configuration;

an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a proximal end and a distal end, said distal end being capable of assuming a curved configuration independent of the catheter tube, said catheter tube and inner medical element together constituting a combination catheter;

at least one of said catheter tube and said inner medical element further having remote control means extending from the proximal end thereof for deflecting the distal end thereof to form said curved configuration;

said combination catheter being composed of at least one material suitable for imaging while the combination catheter is disposed in a human body, so that the shape of the combination catheter may be modified in the human body under examination by imaging;

said inner medical element being axially movable with respect to the catheter tube during operation.

40. (withdrawn) The combination catheter as set forth in claim 39 wherein the catheter tube is remotely controllable to form said curved configuration.

41. (withdrawn) The combination catheter as set forth in claim 39 wherein the inner medical element has a preformed curve in its distal portion.

42. (withdrawn) The combination catheter as set forth in claim 39 wherein the inner medical element is remotely controllable to form said curved configuration.

43. (withdrawn) The combination catheter as set forth in claim 39 wherein the catheter tube has a preformed curve in its distal portion.

44. (withdrawn) A combination catheter comprising:

a catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, the distal end having a first curve preformed therein, said first curve having a first radius of curvature;

an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a proximal end and a distal end, said distal end having a second curve preformed therein, said second curve having a second radius of curvature, said catheter tube and inner medical element together constituting a combination catheter;

the distal ends of both the catheter tube and the inner medical element being defined as extending proximally, measured from the extreme distal tip of each, only a distance not substantially greater than three times the smaller of the first and second radii of curvature;

said combination catheter being composed of at least one material suitable for imaging while the combination catheter is disposed in a human body, so that the shape of the combination catheter may be modified in the human body under examination by

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imaging.

45. (withdrawn) A combination catheter comprising:

a catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a proximal end and a distal end, the distal end having a first curve preformed therein having a first arc length;

an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a proximal end and a distal end, said distal end having a second curve preformed therein having a second arc length, said catheter tube and inner medical element together constituting a combination catheter;

the distal ends of both the catheter tube and the inner medical element being defined as extending proximally, measured from the extreme distal tip of each, only a distance not substantially greater than three times the smaller of the first and second arc lengths;

said combination catheter being composed of at least one material suitable for imaging while the combination catheter is disposed in a human body, so that the shape of the combination catheter may be modified in the human body under examination by imaging.

46. (withdrawn) A combination catheter comprising:

a catheter tube having a wall and an internal lumen extending substantially through the length of the catheter tube, said catheter tube having an outside diameter sufficiently small so that the catheter tube may be inserted into the human body, said

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catheter tube having a proximal end and a distal end, the distal end having a first curve preformed therein;

an inner medical element disposed in the lumen of the catheter tube, said inner medical element having a proximal end and a distal end, said distal end having a second curve preformed therein, said catheter tube and inner medical element together constituting a combination catheter;

the smaller of the first and second curves defining a volume generated by mathematically rotating the smaller curve about an axis of that curve which overlaps at least part of the tube or element containing the larger curve;

said combination catheter being composed of at least one material suitable for imaging while the combination catheter is disposed in a human body, so that the shape of the combination catheter may be modified in the human body under examination by imaging.

47. (withdrawn) The combination catheter as set forth in claim 46 wherein said volume overlaps at least part of the larger curve.

48. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube having a first curve preformed in the distal end thereof, said first curve having a first radius of curvature, said catheter tube being sufficiently small so that the catheter tube may be inserted into the human body and having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen, having a second curve preformed in the distal end thereof, and being axially movable with respect to the catheter tube, said second curve having a

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second radius of curvature, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take;

the distal ends of both the catheter tube and the inner medical element being defined as extending proximally, measured from the extreme distal tip of each, only a distance not substantially greater than three times the smaller of the first and second radii of curvature;

verifying the desired shape by imaging.

49. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube having a first curve preformed in the distal end thereof, said first curve having a first arc length, said catheter tube being sufficiently small so that the catheter tube may be inserted into the human body and having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen, having a second curve preformed in the distal end thereof, and being axially movable with respect to the catheter tube, said second curve having a second arc length, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take;

the distal ends of both the catheter tube and the inner medical element being defined as extending proximally, measured from the extreme distal tip of each, only a distance not substantially greater than three times the smaller of the first and second arc lengths;

verifying the desired shape by imaging.

50. (cancelled)

51. (cancelled)

52. (previously presented) A method of shaping a combination catheter having a polymeric inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable with respect to the catheter tube, at least one of said catheter tube and said polymeric inner medical element being remotely controllable to form a curve in the distal end thereof, said method comprising the steps of:

moving the combination of the catheter tube and the polymeric inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the polymeric inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take, said shaping including manipulating the distal end of at least one of the inner medical element and the catheter tube by remote control to form a curved configuration;

verifying the desired shape by imaging the catheter tube and the inner medical element.

53. (original) The method as set forth in claim 52 wherein the imaging is done by fluoroscopy.

54. (previously presented) The method as set forth in claim 52 wherein the inner medical element is remotely controllable to assume curved configurations, said shaping step including remotely controlling the inner medical element to assume a curved configuration.

55. (original) The method as set forth in claim 52 wherein one of the inner medical element and the catheter tube has a preformed curve in the distal end thereof.

56. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is

disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable with respect to the catheter tube during operation, at least one of said catheter tube and said inner medical element being remotely controllable to form a curve in the distal end thereof, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take, said manipulating step including moving the inner medical element axially with respect to the catheter tube;

verifying the desired shape by imaging the catheter tube and the inner medical element.

57. (original) The method as set forth in claim 56 wherein the imaging is done by fluoroscopy.

58. (original) The method as set forth in claim 56 wherein the inner medical element is remotely controllable to assume curved configurations.

59. (original) The method as set forth in claim 56 wherein one of the inner

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medical element and the catheter tube has a preformed curve in the distal end thereof.

60. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said catheter tube lumen, said inner medical element having a lumen extending therethrough for passage of fluid between the proximal end and the distal end of the combination catheter, said inner medical element further being axially movable with respect to the catheter tube, at least one of said catheter tube and said inner medical element being remotely controllable to form a curve in the distal end thereof, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination catheter can take;

verifying the desired shape by imaging the catheter tube and the inner medical element;

passing fluid through the lumen of the inner medical element.

61. (original) The method as set forth in claim 60 wherein the imaging is done by fluoroscopy.

62. (original) The method as set forth in claim 60 wherein the inner medical element is remotely controllable to assume curved configurations.

63. (original) The method as set forth in claim 60 wherein one of the inner medical element and the catheter tube has a preformed curve in the distal end thereof.

64. (previously presented) A method of shaping a combination catheter having an inner medical element and an outer catheter tube in which the inner medical element is disposed, said outer catheter tube being sufficiently small so that the catheter tube may be inserted into the human body, said catheter tube having a lumen in which the inner medical element is disposed, said inner medical element being disposed in said lumen and being axially movable with respect to the catheter tube, said catheter tube being remotely controllable to form a curve in the distal end of the catheter tube, said method comprising the steps of:

moving the combination of the catheter tube and the inner medical element in a passage in the human body to a desired position;

imaging the catheter tube and the inner medical element while said tube and medical element are disposed in the human body;

shaping the distal end of the combination catheter, during imaging of the catheter tube and the inner medical element, by manipulating the distal end of the combination catheter such that the distal end of the combination catheter takes a desired shape, said desired shape being one of a plurality of possible shapes the distal end of the combination

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catheter can take, said shaping including manipulating the distal end of the catheter tube by remote control to form a curved configuration;

verifying the desired shape by imaging the catheter tube and the inner medical element.

65. (original) The method as set forth in claim 64 wherein the imaging is done by fluoroscopy.

66. (original) The method as set forth in claim 64 wherein the inner medical element is remotely controllable to assume curved configurations.

67. (original) The method as set forth in claim 64 wherein the inner medical element has a preformed curve in the distal end thereof.